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BOTANY REFERENCE NOTES

Paper – I

Plant Resource Development - II

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A Centre of Excellence for Civil Service Examination Guidance

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BOTANY REFERENCE NOTES

Paper – I

Plant Resource Development: Part – II

Topics Covered

Plants as sources for food, fodder, fibre, spices, beverages, edible oils, drugs, narcotics, insecticides, timber, gums, resins and dyes, latex, cellulose, starch and its products, Perfumery

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WOOD

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Technically speaking 'wood' includes secondary xylem elements formed as a result of secondary growth in the stem. Angiospermic wood comprise four components, namely the tracheids, vessels, fibres and parenchyma. On the other hand gymnospermic wood lacks vessels and hence, is called non-porous as against 'porous' of angiosperms.

- * The structural arrangement of various wood components is called 'grain' of wood.
- * The relative size and quality of various wood elements is called texture of wood.
- * The design and pattern that appears on the surface of wood is known as the figure of wood.

- * Strength: Ability of wood to resist certain forces like tension, shearing etc
- * Stiffness: Ability of wood to resist forces that tend to change its shape.
- * Toughness: Ability of wood to absorb sudden and sharp shocks.
- * Cleanability: The ease with which wood is split.
- * Hardness: The ability to resist indentations and abrasion.

REACTION WOOD: A type of wood produced in response to some physical stress. It is of two types:

(a) Compression wood: Produced on lower sides of branches or leaning and crooked stems of conifers.

(b) Tension wood: Produced on the upper side of branches of dicots under leaning and crooking forces.

SEASONING: Removal of moisture from wood.

(1) Air seasoning: Exposure to air, no artificial heat.

(2) Kiln seasoning: Temperature, humidity and air circulation are maintained artificially.

TIMBER:

AEROPLANES:

FOR PROPELLERS: Michelia champaca / Chikrassia tabularis
(Magnoliaceae)

FOR CONSTRUCTION: Abies pindrow (Fir) : Pinaceae
Picea morinda (Spruce) : Pinaceae

FOR LINING: Cryptomeria japonica (Japanese Cedar) : Taxodiaceae
Erythrina suberosa (Coral Tree) : Papilionaceae

FOR TARGETS ? Bombax malabaricum (Semul) - Bombacaceae
OR MODELS :

AGRICULTURAL IMPLEMENTS : Acacia nilotica (Babul) - Mimosaceae
Delbergia sissoo (Sheesham) - Papilionaceae
Shorea robusta (Sal) - Dipterocarpaceae

SHIP BUILDING : Tectona grandis (Sagwan) - Verbenaceae
Quercus sp (Oak) - (Fagaceae) -

LIFE SAVING EQUIPMENTS: Ochroma lagopus (Balsa wood) : Bombacaceae

CARTS & CARRIAGES : Dalbergia sp. \Rightarrow D. sissoo (Sheesham)
D. latifolia (Rosewood)

SPORTS EQUIPMENTS: Racquets : Morus alba (Mulberry) : Moraceae

Billiard cues : Acer sp. (Maple) : Aceraceae

Diospyros melanoxylon (Tendu) : Ebenaceae.
Ebony.

Cricket bats : Salix sp. (Willow) : Salicaceae

Populus sp. (Poplar) :

Fishing rods : Dendrocalamus strictus } Poaceae
Arundinaria falcata

Golf clubs : Hickoria sp.

Fraxinus sp. (Common Ash) : Oleaceae

Gun stocks : Juglans regia (Almond) Juglandaceae

Hockey sticks :

Stick : Morus alba (Shaltoot, Mulberry) - Moraceae

Blade : Dalbergia sissoo

Stumps & bales : Grewia tiliifolia ('Phalsa') : Tiliaceae

Polyalthia fragrans (Ashok) : Annonaceae

MUSICAL INSTRUMENTS:

Sitar, tanpura, veena
and violins:

Adina cordifolia ('Haldu'): Rubiaceae

Debergia sissoo

Cucurbita fruit seeds

Drums:

Albizia lebbek (Sirish): Mimosaceae

Morus alba

Debergia sissoo

PENCILS: Juniperus macrospora (Virginian pencil): Cupressaceae

RAILWAY SLEEPERS: Shorea robusta

Tectona grandis

Mesua ferrea (Nagkesar): Clusiaceae

MINERWORKS AND PITPROPS:

Shorea robusta

Hopea parviflora

PRINTING BLOCKS: Betula alnoides (Betulaceae)

Mitragyna diversifolia (Kaim): Rubiaceae

Toona ciliata (Toon): Rutaceae

OTHER IMPORTANT TIMBER YIELDING PLANTS:

Mahogany Swietenia mahoganii Meliaceae

Cedar/Deodar Cedrus deodara Pinaceae

Red cedar/ Juniperus virginiana "

Sandle wood Santalum album Santalaceae

Willow Salix nigra Salicaceae

Tulip tree Liriodendron tulipifera Magnoliaceae

Mango Mangifera indica Anacardiaceae
'Ash'

Margosa Azadirachta indica Meliaceae
'Neelu'

FIBRES AND FIBRE YIELDING PLANTS

Botanically fibre consists of very long, narrow cells, many times longer than they are broad. They are invariably quite thick walled having a correspondingly small lumen so that the cell cavity often becomes nearly obliterated.

They have simple, often oblique pits in their walls. At maturity, the fibre cell are non-living structures and serve a purely mechanical function i.e. imparting strength and rigidity to the plant-body.

The average length of the fibre cell is 1-3 mm but the ramie fibres are among the longest cells in higher plants being upto 55 cm long.

Fibre durability is conditioned by

1. the diameter of the fibre or fibrous aggregate;
2. thickness of the cell wall; and
3. purity of cellulose.

CLASSIFICATION OF FIBRES:

I. ON THE BASIS OF NATURE AND STRUCTURE:

(a) BAST FIBRES:

Also known as stem or soft fibres;

Associated with phloem, pericycle and cortex;

Derived mostly from dicotyledons;

Usually separated by retting (a process by which fibres are freed from other stem tissue through microbial activity).

Durable and able to resist bleaching;

Examples:

Flax, Jute, Hemp, Kenaf, Roselle and Ramie.

(b) STRUCTURAL FIBRES:

Also known as hard or leaf fibres;

Lignified cells ensheathing both xylem and phloem;

Primarily found in leaves of monocotyledons;

Coarser and weaker than soft fibres;

Separated by mechanical scraping;

Examples:

Manila Hemp, Sisal, New Zealand Hemp.

(C) SURFACE FIBRES:

- Single celled outgrowths from the seeds or inner walls of fruits;
- Moderate in strength;
- Separated mechanically by a process called 'ginning';

Examples:

Cotton, Kapok.

II. ON THE BASIS OF THEIR USE:

(a) TEXTILE FIBRES:

- Used for the manufacture of fabric, netting and cordage;

Examples:

Hemp, Jute and cotton are more common while

Flax is also used sometimes.

(b) BRUSH FIBRES:

- Twigs, leaves and bark are used for making brushes & brooms;

Examples:

Sisal, Piassava and broomcorn.

(C) PLAITING AND ROUGH WEAVING FIBRES:

- Roughly woven into hats, sandles, baskets, chair seats, matting,

and thatched roofs of houses;

Examples:

Carludovica palmata leaves (for making PANAMA HATS) and
Bamboo strips (for manufacturing fishing rods, furniture, buckets etc.)

(d) FILLING FIBRES:

- Used in upholstery, stuffing cushions, mattresses and in life preservers for reinforcement and wallboard insulation.

Examples:

Kapok, Cotton Jute, Spanish Moss, Grasses etc.

(e) NATURAL FIBRES:

- Tree barks are isolated which yield rough clothing after pounding

Example:

Broussonetia papyrifera bark (yields 'tapa cloth').

(f) PAPER MAKING FIBRES:

- Wood fibres, textile fibres and various grasses and sedges are used.

SOME POINTS TO REMEMBER:

| <u>FIBRE</u> | <u>CELLULOSE CONTENT(%)</u> |
|--------------|-----------------------------|
| COTTON | 94% |
| SUNNHEMP | 80% |
| HEMP | 67% |
| FLAX | 64% |
| JUTE | 63% |



| COMMON NAME OF THE PRODUCT | BOTANICAL NAME OF THE SOURCE PLANT | FAMILY | PLANT PART AND MORPHOLOGICAL COMMENT AND IMPORTANT FACTS | USES |
|----------------------------|------------------------------------|---------------|--|--|
| COTTON | | | | |
| Old world | <i>Gossypium arboreum</i> | Malvaceae | Epidermal hairs from the seed coat are the useful part. | Textile and filling |
| | <i>G. herbaceum</i> | " | | |
| New world | <i>G. hirsutum</i> | " | | |
| | <i>G. barbadense</i> | " | | |
| SUNN HEMP | <i>Crotalaria juncea</i> | Papilionaceae | Best fibres from the stem. fibres possess great tensile strength and resistance to microbes and moisture. | Essentially a cordage fibre. Used in making sail cloth, canvas and tissue paper. |
| HEMP | <i>Cannabis sativa</i> | Cannabaceae | Best fibre from the stem; valuable because of their length, strength and durability; unaffected by water; resistant to normal bleaching. | Used where strength is more important than beauty as in carpentry, canvas, sackings, rope, cables etc. |

| C.N | B.N. | F. | MORPHOLOGY | USES |
|------------|-----------------------|--------------|---|---|
| CONGO JUTE | <u>Urena lobata</u> | Malvaceae | Obtained from the bark of the stem. | Ropes, Carpets lessain etc. |
| COIR | <u>Cocos nucifera</u> | treeaceae | The fibres are hard structural fibres obtained from the husks (mainly mesocarp) of the fruits. | As floor covering, in rope making, artificial horse hair, paper pulp, thermal insulation, olive oil filters in filling seats etc. |
| PINEAPPLE | <u>Ananas comosus</u> | Bromeliaceae | Leaves are the source of a strong fibre which is shiny white, durable flexible and water-resistant. | Made into fabrics ropes, fishing-nets and strings. |

| C.N. | B.N. | F. | MORPHOLOGY | Uses |
|----------------------------|---------------------------------|----------------|--|--|
| MANILA HEMP OR ABACA | <u>Musa textilis</u> | Musaceae | A structural fibre obtained from the outer portions of the leaf stalks | Cordage, especially marine cables; 'shuti' is also made from them. |
| SISAL HEMP | <u>Agave sisalana</u> | Agavaceae | A structural fibre obtained from the leaves. | Ropes and twines |
| MAURITIUS HEMP | <u>Furcraea foetida</u> | Amoryllidaceae | Structural fibres from the leaves. | Used for cordage, mats, sacks and soles of shoes. |
| NEWZEALAND HEMP | <u>Phormium tenax</u> | Agavaceae | Fibre from stem is obtained and variously used. | For twine, cordage, matting and twines. |
| INDIAN BOWSTRING HEMP | <u>Sansevieria roxburghiana</u> | Liliaceae | Structural fibres are obtained from the succulent leaves. | For cordage and matting. |

| C.N. | B.N. | F. | MORPHOLOGY | USES |
|-----------------------------|-----------------------------|-------------|--|--|
| ROSELLE | <u>Hibiscus sabdariffa</u> | Malvaceae | A bast fibrous, soft and lustrous; comparable to jute in strength and durability. | Generally the same uses as those of Jute. |
| RAMIE | <u>Boehmeria nivea</u> | Urticaceae | A bast fibre; long, strong and durable; longest-continued fibres in plants. | Sacks, thread, cordage, paper and gas mantles. |
| COUNTRY MALLOW | <u>Abutilon indicum</u> | Malvaceae | A bast fibre of average properties. | used for ropes, twine and cordage. |
| CHINA JUTE OR TIENTSIN JUTE | <u>Abutilon theophrasti</u> | | " | " |
| KAPOK | <u>Ceiba pentandra</u> | Bombacaceae | A surface fibre obtained from the fruit; very elastic and not liable to bunch when used in upholstery. | Excellent stuffing material for pillows, cushions, mattresses etc; Also used in making life-belts. |

| C.N. | B.N. | F. | MORPHOLOGY | USES |
|-------------------|---|------------------|--|---|
| RED SILK COTTON | <u>Bombax ceiba</u> | Bombacaceae | A surface fibre, the silky floss is obtained from the inner wall of the fruit. | It has the same uses as those of Kapok. |
| WHITE SILK COTTON | <u>Cochlospermum religiosum</u> | Cochlospermaceae | The fibre is obtained from the flowers. | Same as in Kapok. |
| MADAR ARUND | <u>Calotropis gigantea</u> <u>C. procera</u> | Asclepiadaceae | Floss is obtained from the seed surface. | Same as in Kapok. |
| CAT'S TAIL | <u>Typha angustifolia</u> | Typhaceae | Hairs on the fruits are of commercial value. | Same as in Kapok. |

| COMMON NAME OF THE PRODUCT | BOTANICAL NAME OF THE SOURCE PLANT | FAMILY | PLANT PART WITH MORPHOLOGICAL COMMENT AND IMPORTANT FACTS | USES |
|----------------------------|------------------------------------|------------------|--|---|
| <u>JUTE</u> | <u>White Jute</u> | <u>Tiliaceae</u> | A bast fibre of great commercial importance; weaker than hemp | Bagging, wrapping, cordage; manufacture of |
| | <u>Tossa Jute</u> | " | and flax; perishable when exposed to damp -ess. | rugs, blankets carpets etc. |
| | | | | |
| | | | | |
| <u>FLAX</u> | <u>Linum usitatissimum</u> | <u>Linaceae</u> | A bast fibre known for their fineness, durability, flexibility, heat conductivity, moisture absorbance and great strength especially when wet. | Woven into fabrics used in household furnishing and as linen thread for flax garments |
| | | | | are quite cool in summers. |
| | | | | |
| | | | | |
| <u>KENAF</u> | <u>Hibiscus cannabinus</u> | <u>Malvaceae</u> | A bast fibre extracted from the inner cortex; it is comparable to jute in lustre, but is coarser and more brittle. | Rope and cordage fishing nets, sacks and gunny bags coarser canvas etc. |
| | | | | |
| | | | | |
| | | | | |

CEREALS AND PSEUDOCEREALS

The cereals have come to be the most important source of food for human beings. They belong to the family Poaceae and bear fruits called caryopses. The general term under usage, for caryopsis, is 'grain'.

A broad classification recognises the following four major categories of the cereals:

- ① MAJOR CEREALS: They include wheat, rice and maize.
- ② MINOR CEREALS: They cover barley, oat and rye.
- ③ SMALL GRAINS: Sorghum is an example of small grains.
- ④ MILLETS: Pearl millet, finger millet and fox-tail millet are the examples.

Moreover, a few plants yield seeds which are used as substitute to the cereal grains. Such plants are called 'pseudocereal' yielding plants. 'Kudu' or Buckwheat is an example of pseudocereal.

| COMMON NAME | BOTANICAL NAME | FAMILY | COMMENTS |
|----------------------------|---|-------------------|---|
| MAJOR CEREALS | | | |
| PADDY / RICE. | <u>Oryza sativa</u> | Poaceae | Fruit / grain yields kernel. The grain contains about 90% carbohydrates, 8-10% proteins, 1% fats and about 1% mineral matter. |
| 'Dhan' / 'Chawal' | | | |
| 3 varieties of Indian rice | <div> <div>[SOWING]</div> <div>[HARVESTING]</div> </div> <div> <div>'Aus': May/June</div> <div>September/October</div> </div> | | |
| | 'Amam': June/July | November/December | |
| | 'Boro': December/January | March/April | |
| WHEAT or 'Gehun' | <u>Triticum</u> sp. | " | Fruit / grain contains some 60-70% carbohydrates and 10-17% nitrogenous material. |
| 3 varietal categories: | | | |
| EINKORN GROUP: | <u>Triticum monocoecum</u> , <u>T. boeotium</u> etc. | | |
| EMMER GROUP: | <u>T. dicoccum</u> , <u>T. durum</u> etc. | | |
| VULGARE GROUP: | <u>T. aestivum</u> subsp. <u>vulgare</u> , <u>T. aestivum</u> subsp. <u>spelta</u> etc. | | |

| C.N. | B.N. | F. | Comments |
|--|---|---------|---|
| 'INDIAN CORN' 'Makka' | <u>Zea mays</u> | POACEAE | The fruit is a caryopsis (like the previous cases) rice and wheat) and possess two kinds of endosperm, white and yellow, thus exhibiting the phenomenon of xenia. The grain contains carbohydrates proteins pts calcium m(Ca), magnesium (Mg) vitamins A, B, C etc. |
| Major Types: SWEET CORN: POP CORN: SOFT CORN: | <u>Z. mays-saccharata</u> <u>Z. mays-everta</u> <u>Z. mays-amylacea</u> | | |
| MINOR CEREALS | | | |
| BARLEY 'Jau' | <u>Hordeum vulgare</u> | " | Caryopsis type of fruit bears 70% carb hydrates, 12% proteins and 2% mineral contents. |

| C.N. | B.N. | F | COMMENTS |
|---------------|-----------------------|---------|--|
| OAT or 'Jali' | <u>Avena sativa</u> | Poaceae | Caryopsis contains about 82% non-nitrogenous matter including carbohydrates, 14% nitrogenous matter and 4% mineral matter. |
| RYE | <u>Secale cereale</u> | " | Also described as the grain of poverty. |

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| C.N. | B.N. | F. | COMMENTS |
|---------------------------|-------------------------------|--------------|--|
| FINGER MILLET ("Ragi") | <u>Eleusine Coracana</u> | Poaceae | Caryopsis. |
| KODO MILLET | <u>Paspalum scrobiculatum</u> | " | " |
| PSEUDOCEREALS | | | |
| 'BUCKWHEAT' ('Kutlu') | <u>Fagopyrum esculentum</u> | Polygonaceae | Seeds are hulled and their starch is made into flour which is eaten by many during ritual fasts like 'Navratri', as a substitute to grains of Cereals. |

PULSES

Pulses are obtained from the members of the dicotyledonous angiospermic family of plants, namely Leguminosae. The legumes or pods (fruit type) of the members split open along both the sutures to expose the dicotyledonous seeds. It is these seeds which constitute the pulses of commerce.

They are rich sources of proteins and sometimes the only source thereof for poor people.

| COMMON NAME | BOTANICAL NAME | FAMILY | PART USED |
|---------------------------|--------------------------|---------------|-----------|
| PEA OR 'Matar' | <u>Pisum sativum</u> | Papilionaceae | Seeds |
| GRAM OR 'Chana' | <u>Cicer arietinum</u> | " | " |
| Black Gram OR 'Urd' | <u>Vigna mungo</u> | " | " |
| GREEN GRAM OR 'Moong' | <u>Vigna radiata</u> | " | " |
| COWPEA OR 'Lobia' | <u>Vigna unguiculata</u> | " | " |
| BROAD BEANS OR 'Bakla' | <u>Vicia faba</u> | " | " |
| PIGEON PEA OR 'Arhar' | <u>Cajanus cajan</u> | " | " |

| C.N. | B.N. | F. | PART USED | |
|---|--------------------------------|---------------|--|--|
| LENTIL OR 'Maseer' | <i>Lens culinaris</i> | Papilionaceae | Seeds | |
| SORBEAN | <i>Glycine max</i> | " | " | |
| PEANUT, GROUNDNUT OR 'Moongphali' | <i>Arachis hypogaea</i> | " | Seeds are often eaten after roasting. | |
| CLUSTER BEAN OR 'Gwar' | <i>Cyamopsis tetragonoloba</i> | " | seeds. | |
| LIMA BEAN | <i>Phaseolus lunatus</i> | " | " | |
| 'Moth' | <i>Vigna acutifolia</i> | " | " | |
| HORSE GRAM | <i>Belichos biflorus</i> | " | " | |

'FATS' and 'OILS' denote crude lipid mixtures obtained from natural sources. Fats are solid at room temperatures and oils are liquid. They could be grouped as follows:

① ESSENTIAL OILS: They evaporate on coming in contact with air and hence emit pleasant fragrance. They are, therefore, also known as volatile oils. Extraction occurs by distillation or pressure e.g. Lemon grass oil, Neroli oil, Lavender oil.

② FATTY OILS: They don't get evaporated and are actually the reserve food of seeds. Their nickname is 'fixed oils' and they are extracted through application of pressure. They have further four categories:

① Drying oils: They dry up, forming an elastic film.
eg: Tung oil, Safflower oil and Soybean oil etc.

② Semi-drying oils: They include mustard oil, rapeseed oil, sunflower oil, cottonseed oil etc.

③ Non-drying oils: Peanut oil, Olive oil etc are the examples.

④ Vegetable fats: They include coconut oil and palm oil etc.

IMPORTANT POINTS :

- * It could be important to note that common fatty acids are either saturated (eg. palmitic acid, stearic acid) or unsaturated (eg. oleic acid, linoleic acid and linolenic acid).
- * Drying oils mainly contain linoleic and linolenic acids while drying oils contain oleic acids predominantly.
- * Coconut oil contains rich amounts of lauric and myristic acids.
- * Palm oil is rich in oleic and palmitic acids and appears orange in colour due to β -carotene. It is a substitute for cod liver oil.
- * Tung oil is especially rich in eleostearic acid.
- * Soybean oil is highly unsaturated and contains sitosterol and stigmasterol.

OILS

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | USES |
|-------------|-------------------------|---------------|--------------|---|
| CORN OIL | <u>Zea mays</u> | Poaceae | seeds. | Edible; in soaps and paints. |
| PEANUT OIL | <u>Arachis hypogaea</u> | Papilionaceae | " | Edible and in soap industry |
| OLIVE OIL | <u>Olea europaea</u> | Oleaceae | Fruits | Edibles; and in soap & paint industry. |
| CASTOR OIL | <u>Ricinus communis</u> | Euphorbiaceae | seed | As protective coating, lubricant, illuminant etc. |
| COCONUT OIL | <u>Cocos nucifera</u> | Arecaceae | " | Edible, in soaps, confectionary and cosmetics. |

| C.N. | B.N. | F | PARTS USED | USES |
|-----------------|----------------------------|--------------|------------|--|
| MUSTARD OIL | <u>Brassica campestris</u> | Brassicaceae | Seeds | Edible and as an illuminant & lubricant and in soap and rubber industry. |
| RAPSEED OIL | <u>B. napus</u> | " | " | As illuminant and lubricant and in cooking |
| COTTON SEED OIL | <u>Gossypium</u> sp. | Malvaceae | " | Edible, used also in soap. |
| SUNFLOWER OIL | <u>Helianthus annuus</u> | Asteraceae | " | Edible and in paint and soap industry. |
| SESAME OIL | <u>Sesamum indicum</u> | Pedaliaceae | " | Edible; hair oil, soaps etc |

| C.N. | B.N. | F. | PART(S) USED | USES |
|--------------------|--|-------------|-----------------------------|---|
| Otto of Roses | <u>Rosa damascena</u> <u>R. centifolia</u> | Rosaceae | Flowers. | Perfumery. |
| Rosmary oil | <u>Rosmarinus officinalis</u> | Lamiaceae | Leaves and flowering twigs. | |
| Sandalwood oil | <u>Santalum album</u> | Santalaceae | Wood. | Perfumery and medicinal industry |
| 'Khas' | <u>Vetiveria zizanioides</u> | Poaceae | Roots. | Perfumery and cosmetics. |
| 'Kapur' or Camphor | <u>Cinnamomum camphora</u> | Lauraceae | wood. | Medicines. |
| Eucalyptus oil | <u>Eucalyptus globulus</u> <u>E. citriodora</u> | Myrtaceae | Leaves. | In perfumery and as insect repellent and germicide. |

| C.N. | B.N. | F. | PARTS USED | USES |
|------------------|---------------------------------|------------|-----------------------|------------------------------------|
| Ylang ylang oil | Cananga odorata | Annonaceae | Flowers yield oil. | In perfumery and soap manufacture. |
| 'Neroli oil' | Citrus aurantium var. aurantium | Rutaceae | Flowers | In perfumery. |
| 'Petitgrain oil' | " | " | Leaves & young shoots | " |
| Lemongrass oil | Cymbopogon citratus | Poaceae | Leaves | " |
| Citronella oil | C. nardus | " | " | " |
| Palmarosa oil | C. martinii var. motia | " | " | " |
| Ginger grass oil | C. martinii var. sofia | " | " | " |
| Tamrine oil | Tamrinum sp. | Olacaceae | Flowers | |
| Lavender oil | Lavandula officinalis | Lamiaceae | " | Perfumery and cosmetics. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|----------------|------------------------------|-----------------|--------------|--|
| Clove oil | <u>Syzygium aromaticum</u> | Myrtaceae | Flower buds | As stimulant, carminative and toothache relieves and also in toilet preparation. |
| Linaloe | <u>Bursera penicillata</u> | Burseraceae | Wood | In perfumery. |
| Cyperus oil | <u>Cyperus scariosus</u> | Cyperaceae | Tubers. | In perfumery and as fixative. |
| Carnation oil | <u>Dianthus caryophyllus</u> | Caryophyllaceae | Flowers. | In perfumery |
| Hyacinth oil | <u>Hyacinthus orientalis</u> | Liliaceae | Flowers. | " |
| Cedar wood oil | <u>Juniperus virginiana</u> | Cupressaceae | Wood. | In perfumery, soaps, medicine, polishing and insecticide. |
| Champaca oil | <u>Michelia champaca</u> | Magnoliaceae | Flowers | In perfumery |

| C.N. | B.N. | F. | PART(S) USED | USES |
|----------------|------------------------------------|---------------|--------------|---|
| TUNG OIL | <u>Alnus</u> <u>cordii</u> | Euphorbiaceae | Seeds. | In varnishes as substitute of linseed oil. |
| SAFFLOWER OIL | <u>Carthamus</u> <u>tinctorius</u> | Asteraceae | Seeds. | In varnishes, cosmetics and also as illuminant. |
| SOYBEAN OIL | <u>Glycine</u> <u>max</u> | Papilionaceae | Seeds | As cooking medium and salad oil. |
| LINSEED OIL | <u>Linum</u> <u>usitatissimum</u> | Linaceae | " | In paint and varnishes. |
| NIGER SEED OIL | <u>Guizotia</u> <u>abysinnica</u> | Asteraceae | " | In soap and as illuminant. |
| POPPY OIL | <u>Papaver</u> <u>concoloratum</u> | Papaveraceae | " | In paints, as illuminant. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|---------------|---|---------------|--------------|---------------------------------|
| 'Nutmeg oil' | <u>Myristica fragrans</u> | Myristicaceae | Seed | In cosmetics and confectionary. |
| MENTHOL | <u>Mentha arvensis</u> var <u>piperascens</u> | Lamiaceae | Leaves | In medicines, cosmetics and |
| GERANIUM OIL | <u>Pelargonium graveolens</u> | Geraniaceae | " | In perfumery |
| PATCHOULI OIL | <u>Pogostemon cablin</u> <u>P. benghalense</u> | Lamiaceae | " | In medicine and perfumery |

| C.N. | B.N. | F. | PART(S) USED | USES |
|-----------|--------------------------|------------|--------------|--|
| PALM OIL | <u>Elaeis guineensis</u> | Arecaceae | Fruit. | In cooking, as lubricant and in soaps. |
| MAHUA OIL | <u>Madhuca indica</u> | Sapotaceae | Seed | In cooking and in candles |

VEGETABLES.

Vegetables are those plants which storeup reserve food in roots, stems, leaves and fruits which are eaten cooked or raw as salad plants.

Vegetables are conveniently categorised into three classes -

(I) EARTH VEGETABLES: They store food in their underground parts in roots or stems.

eg: Potato, 'Mooli', 'Gajar', 'Chukander' etc.

(II) FRUIT VEGETABLES: Their ~~roots~~ fruits are eaten as vegetables.

eg. 'Bhindi', 'Kathal', 'Kaddu', 'Baingan' and 'Pamatar' etc.

(III) LEAF VEGETABLES: Their leaves are cooked or eaten raw as salad.

eg: 'Pyaj', 'Lahsun', 'Band Gobhi', 'Salad patta', 'Paalak', 'Battua' etc.

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | |
|------------------------|------------------------------|----------------|-----------------|--|
| BETT OR 'Chukander' | <u>Beta vulgaris</u> | Chenopodiaceae | Stem. | |
| POTATO OR 'Aloo' | <u>Solanum tuberosum</u> | Solanaceae | Stem (Tubers) | |
| 'Arvi' | <u>Coccolasia esculenta</u> | Araceae | Tubers | |
| TARO OR 'Kachalu' | <u>Coccolasia antiquorum</u> | " | Corms | |
| Kasaru | <u>Cyperus esculentus</u> | Cyperaceae | Tubers | |
| YAM OR 'Pindalu' | <u>Dioscorea alata</u> | Dioscoreaceae | Corn and bulbil | |
| Jerusalem Artichoke | <u>Helianthus tuberosus</u> | Asteraceae | Tubers | |
| Kamal Kaksi' | <u>Nelumbo nucifera</u> | Nelumbonaceae | Rhizomes. | |
| 'Kamal Kaksi' | <u>Nymphaea nouchali</u> | Nymphaeaceae | " | |

| C.N. | B.N. | F. | PART(S) USED |
|---------------------------------|------------------------------------|----------------|---------------------|
| TURNIP OR 'Shalgani' | <u>Brassica rapa</u> | Brassicaceae | Roots and leaves |
| RADISH OR 'Mooli' | <u>Raphanus sativus</u> | " | " |
| CARROT OR 'GATAR' | <u>Daucus carota</u> | Apiaceae | Roots. |
| SWEET POTATO OR 'Shakarkand' | <u>Ipomoea batata</u> | Convolvulaceae | Adventitious roots. |
| ELEPHANT FOOT OR 'Zinnikand' | <u>Amorphophallus campanulatus</u> | Araceae | Corn |
| 'Sunthni' | <u>Dioscorea esculenta</u> | Dioscoreaceae | Roots |
| CASSAVA | <u>Manihot esculenta</u> | Euphorbiaceae | " |

| C.N. | B.N. | F. | PART(S) USED | |
|--------------------------------|----------------------------|----------------------|---------------|--|
| PUMPKIN or 'Satahal' | <i>Cucurbita moschata</i> | <i>Cucurbitaceae</i> | Fruits (Pepo) | |
| RED PUMPKIN | <i>C. maxima</i> | " | " | |
| FIELD PUMPKIN | <i>C. pepo</i> | " | " | |
| BOTTLE Gourd or 'Lauki' | <i>Lagenaria siceraria</i> | " | " | |
| SPONGE Gourd or 'Ghigharai' | <i>Luffa cylindrica</i> | " | " | |
| BITTER Gourd or 'Karela' | <i>Momordica charantia</i> | " | " | |
| CHAYOTE | <i>Sechium edule</i> | " | " | |
| SNAKE Gourd or 'Chichinda' | <i>Melothria anguina</i> | " | " | |
| POINTED Gourd 'Parwal' | <i>T. dioica</i> | " | " | |

| C.N. | B.N. | F. | PART(S) USED |
|--|---|---------------|--------------------|
| LADY'S FINGER OR 'Okra'/'Bhindi' | <u>Abelmoschus esculentus</u> | Malvaceae | Fruits. (Capsules) |
| JACK FRUIT OR 'Kathal' | <u>Astocarpus integrifolia</u> | Moraceae | Fruits (Sorosis) |
| TOMATO 'Tamatar' | <u>Lycopersicon esculentum</u> | Solanaceae | Fruit (Berries) |
| BRINJAL OR 'Baigan' | <u>Solanum melongena</u> | " | " |
| ASH GOURD OR 'Petha' | <u>Benincasa hispida</u> | Cucurbitaceae | Fruits (Pepo) |
| 'Tinda' | <u>Citrullus lanatus</u> var. <u>pistilosus</u> | " | " |
| 'Kundru' | <u>Coccinia cordifolia</u> | " | " |
| CUCUMBER OR 'Kheera' | <u>Cucumis sativa</u> | " | " |

| C.N. | B.N. | F. | PART(S) USED | |
|-------------------------|----------------------------------|----------------|-----------------------------|--|
| LEETUCE or 'Salad' | <u>Lactuca sativa</u> | Asteraceae | Basal rosette of leaves. | |
| SPINACH or 'Palak' | <u>Spinacea oleracea</u> | Chenopodiaceae | " | |
| 'CELERY' or 'Ajmod' | <u>Apium graveolens</u> | Apiaceae | Leaves. | |
| 'Chaulai' | <u>Amaranthus</u> sp. | Amaranthaceae | Leaves | |
| 'Satarav' | <u>Asparagus officinalis</u> | Liliaceae | Young twigs. | |
| Fenugreek or 'Menth' | <u>Trigonella foenum-graecum</u> | Papilionaceae | Leaves & twigs. | |
| PURSLANE or 'Kulfa' | <u>Portulaca oleracea</u> | Portulacaceae | Leaves. | |
| 'Nari-Ka-Saag' | <u>Sponoe aquatica</u> | Centrulaceae | Leaves. | |

| C.N. | B.N. | F. | PART(S) USED |
|--------------------------------------|---------------------------------|--------------|--|
| ONION 'Pyaj' | Allium cepa | Liliaceae | Bulbs and leaves. It contains allyl sulphide |
| GARLIC OR 'Lahsun' | Allium sativum | " | Bulbs and leaves. It contains diallyl disulphide. |
| CAULIFLOWER OR 'Phool Gobhi' | Brassica oleracea var. botrytis | Brassicaceae | Inflorescence. |
| CABBAGE OR 'BAND GOBHI' | B. oleracea var. capitata | | Leaves. |
| Khol OR 'Ganth Gobhi' | B. oleracea var. gongylodes | | Stem. |
| BRUSSELS SPROUT OR 'Button Gobhi' | B. oleracea var. gemmifera | | Axillary buds. |
| CHINESE CABBAGE | B. oleracea var. pekinensis | | Leaves. |

Technically, 'fruit' means a structure developed from a single ovary of a single flower. Commercially, however, the term fruit includes even such structures which are edible and contributed by ovary as well as some accessory parts of the flower or inflorescence. The former case is termed as 'aggregate fruit' and the latter as composite fruit.

For commercial usage, fruits are categorised as follows:

- (I) TROPICAL FRUITS: They include 'cheeku', 'Ananas', 'Shareeda', 'Papeeta', 'Neebu', 'Santara', 'litchi', 'Aam', 'Amrood', 'Anar', 'Bel', 'Aangeer', 'Kela', 'Phalsa', etc.
- (II) TEMPERATE FRUITS: They include 'Kharbuja', 'Tarboze', 'Shalitoot', 'Seb', 'Nashpati', 'Khubani', 'Karn', 'Aangoor', etc.

| COMMON NAME | BOTANICAL NAME | FAMILY | FRUIT TYPE | EDIBLE PART |
|-----------------------------|-----------------------------|--------------|------------|-----------------------|
| FIG (Anjeer) | <u>Ficus carica</u> | Moraceae | Sycous. | Receptacle. |
| MANGOSTEEN | <u>Garcinia mangostana</u> | Garciniaceae | Berry | Pericarp |
| PHALSA | <u>Grewia subinaequalis</u> | Tiliaceae | " | " |
| Khirni' | <u>Manilkara hexandra</u> | Sapotaceae | " | " |
| JAMBOLAN (Jambun) | <u>Syzygium cumini</u> | Myrtaceae | " | " |
| Rose Apple (Gulab Jamun) | <u>S. jambos</u> | " | " | " |
| DATE (Pind Khajur) | <u>Phoenix dactylifera</u> | Arecaceae | " | " |
| DATE (Khajur) | <u>P. sylvestris</u> | " | " | " |
| OLIVE (Jaitoon) | <u>Olea europea</u> | Oleaceae | Drupe | Mesocarp. |
| Tujube (Ber) | <u>Zizyphus jujuba</u> | Rhamnaceae | " | Epicarp and Mesocarp. |

| C.N. | B.N. | F. | FRUIT TYPE | EDIBLE PART(S) |
|-----------------------------|----------------------------|---------------|--------------|---------------------------------|
| GUAVA (Amrud) | <u>Psidium guajava</u> | Myrtaceae | Berry. | Pericarp and Placenta. |
| POMEGRANATE (Anaar) | <u>Punica granatum</u> | Punicaceae | Balanata. | Testa of seed. |
| WOOD APPLE (Isal) | <u>Aegle marmelos</u> | Rutaceae | Amphisaraca. | Placenta and inner pericarp. |
| CARAMBOLA (Kamrakh) | <u>Averrhoa carambola</u> | Oxalidaceae | Berry | Pericarp. |
| 'Karaunda' | <u>Cassia carandus</u> | Apocynaceae | Berry | Pericarp |
| PEKISHMON | <u>Diospyros kaki</u> | Ebenaceae | " | " |
| 'Aonla' | <u>Emblica officinalis</u> | Euphorbiaceae | " | " |
| LOCQUAT | <u>Eriobotrya japonica</u> | Rosaceae | " | Meocarp. |
| ELEPHANT APPLE (Kairith) | <u>Feronia limonia</u> | Rutaceae | Amphisaraca | Placenta and inner pericarp. |

| C.N. | B.N | F. | FRUIT TYPE | EDIBLE PART |
|---|----------------------------|----------|-------------|-----------------------|
| LIME (Kagzi Nibu) | <u>Citrus aurantifolia</u> | Rutaceae | Hesperidium | Twicy endocarp hairs. |
| BITTER ORANGE (Khatta) | <u>C. aurantium</u> | " | " | " |
| LEMON (Nibu) | <u>C. limon</u> | " | " | " |
| SWEET LIME (Meetha Neebu) | <u>C. limetlioides</u> | " | " | " |
| SHADDOCK (Chakotra) | <u>C. maxima</u> | " | " | " |
| CITRON (Bata Neebu) | <u>C. medica</u> | " | " | " |
| GRAPE FRUIT (Pahari Neebu) | <u>C. paradisi</u> | " | " | " |
| LOOSE SKIN/MANDARIN ORANGE (Santara) | <u>C. reticulata</u> | " | " | " |
| SWEET ORANGE (Mosambi) | <u>C. sinensis</u> | " | " | " |

| C.N. | B.N. | F. | FRUIT TYPE | EDIBLE PART(S) |
|---|---|---------------|-------------------|------------------------|
| MUSK MELON (Kharbooya) | <u>Cucumis melo</u> | Cucurbitaceae | Pepo. | Mesocarp and endocarp. |
| WATER MELON (Tarbooz) | <u>Citrullus lanatus</u> | " | " | " |
| CUCUMBER | <u>Cucumis sativus</u> | " | " | " |
| CUCUMBER (Kakri) | <u>Cucumis utilisissimus</u> | " | " | " |
| MULBERRY | <u>Morus alba</u> (white) <u>Morus nigra</u> (black) | Moraceae | Sorosis " | Fleshy perianth |
| Grape (Angoor) | <u>Vitis vinifera</u> | Vitaceae | Berries | Pericarp and placenta. |
| ALPINE STRAWBERRY | <u>Fragaria vesca</u> | Rosaceae | Stems of achenes. | Fleshy thalamus |
| RASPBERRY (Rasp) (Hissalu) | <u>Rubus</u> sp. | Rosaceae | Stems of drupes. | Pericarp. |
| 'CHIRONJI' | <u>Buchanania lanzan</u> | Anacardiaceae | Drupe | Seed. |

| C.N. | B.N. | F. | FRUIT TYPE | EDIBLE PART(S) |
|----------------------------|------------------|---------------|---------------------|---|
| SAPODILLA (Cheeku) | Achras sapota | Sapotaceae | | Epicarp. |
| PINE APPLE * (Ananas) | Ananas sativa | Bromeliaceae | Sorosis | Outer axis, bract, perianth and pericarp. |
| CUSTARD APPLE (Sharifa) | Anona squamosa | Anonaceae | Etaerio of berries. | Pericarp. |
| PAPAYA (Papeeta) | Carica papaya | Caricaceae | Berries | Mesocarp. |
| LITCHI | Litchi sinensis | Sapindaceae | Nuts | Asil |
| MANGO (Fam) | Mangifera indica | Anacardiaceae | Drupe | Mesocarp. |
| BANANA (Kela) | Musa paradisiaca | Musaceae | Berry | Mesocarp and endocarp. |

| C.N. | B.N. | F. | FRUIT TYPE | Evolution |
|--------------------------|----------------------------------|----------|------------|--------------------------|
| ALMOND (Badam) | <u>Prunus amygdalus</u> | Rosaceae | Drupe | Edible parts Seed. |
| APRICOT (Khubani') | <u>Prunus ameniaca</u> | Rosaceae | Drupe | Episarp and mesocarp. |
| SWEET CHERRY (Gilas') | <u>P. avium</u> | " | " | " |
| PLUM (Amlucha) | <u>P domestica subsp. indica</u> | " | " | " |
| PEAR (Aam) | <u>P. persica</u> | " | " | " |
| PEAR (Nadipatti) | <u>Pyrus communis</u> | " | Pome | Fleshy thalamus |
| APPLE (Seb) | <u>P. malus</u> | " | " | " |
| CHINESE PEAR | <u>P. pyrifolia var. culta</u> | " | " | " |

| C.N. | B.N. | F. | FRUIT TYPE | EDIBLE PARTS |
|--|---|---------------|----------------------|--|
| PISTACHIO NUT or 'Pista' | <u>Pistacia vera</u> | Anacardiaceae | Drupe | Seeds (Cotyledons) |
| ENGLISH WALNUT or 'Akhrot' | <u>Juglans regia</u> | Juglandaceae | " | " |
| COCONUT or 'Naiygal' | <u>Cocos nucifera</u> | Arecaceae | " | Seeds or kernel called 'COPRA' or liquid endosperm |
| BRAZIL NUT | <u>Bertholletia ornata</u> | Leguminosae | NUTS | Seeds. |
| AMERICAN CHESTNUT JAPANESE CHESTNUT | <u>Castanea dentata</u> <u>C. crenata</u> & <u>C. sativa</u> | Fagaceae | NUTS | " |
| HICKORY NUT | <u>Carya ovata</u> | Juglandaceae | NUTS | " |
| HAZEL NUT | <u>Corylus americana</u> | Betulaceae | NUTS | " |
| PINE NUT or 'Chilgoza' | <u>Pinus gerardiana</u> | Pinaceae | NO FRUIT IS PRODUCED | SEEDS. |

SPICES AND CONDIMENTS

evolution

Due to little nutritive value they are technically excluded from food articles. However, owing to their aroma, flavouring ability and preservative value, they are deemed significant. Several spices have carminative and antiseptic property also.

For all practical purposes, the term spice is restricted to hard and hardened parts of the plants usually used after pulverisation, and the term 'condiment' includes spices and any other flavouring materials that have sharp taste and usually added to food after it has been cooked.

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | USES |
|------------------------|------------------------------|---------------|--|--|
| ANGELICA or 'Chora' | <u>Angelica archangelica</u> | Apiaceae | Roots and fruits | In flavouring cakes and liquors. |
| TURMERIC or 'Haldi' | <u>Curcuma longa</u> | Zingiberaceae | Rhizomes contain 'curcumin'. | Ingredient in numerous Indian curries. |
| ASAFOETIDA or 'Heeng' | <u>Ferula asafoetida</u> | Apiaceae | Roots yield a gum-resin. | Flavouring for |
| GINGER or 'Adrak' | <u>Zingiber officinale</u> | Zingiberaceae | Rhizomes are used fresh or dried ('SAUNTH'). Its essential oil contains a sesquiterpene zingiberene. | Flavouring for drinks and liquors. |
| GALANGAL or 'Kulingar' | <u>Alpinia galanga</u> | Zingiberaceae | Rhizomes. | Flavouring for |

| C.N. | B.N. | F. | PART(S) USED | USES |
|------------------------------------|-------------------------------------|------------|--|---|
| 'RED' CHILLIES 'Lal mirch' | <u>Capsicum</u> <u>frutescens</u> . | Solanaceae | Fruits contain the pungent principle called 'capsaicin'. | As a condiment in curries, sauces and pickles. |
| 'Shimla Mirch' | <u>C. annuum</u> . | " | " | As vegetable also. |
| 'Siah Zeera' ^{OR} CARAWAY | <u>Carum</u> <u>causvi</u> | Apiaceae | Fruits. | In Confectionary, bakery and in flavouring beverages. |
| 'Zeera' or CUMIN | <u>Cuminum</u> <u>cyminum</u> | " | " | In curries, chutneys, pickles, soups etc. |
| FENNEL ^{OR} 'saunf' | <u>Foeniculum</u> <u>vulgare</u> | " | " | Flavouring food liquors and masticatories. |
| Black pepper 'Kali Mirch' | <u>Piper</u> <u>nigrum</u> | Piperaceae | Fruits contain an alkaloid 'piperine'. | Flavouring cuisin and pickles. |
| LONG PEPPER 'PEPPAL' | <u>P. longum</u> | " | " | |

| C.N. | B.N. | F. | PART(S) USED | USES |
|------------------------------------|-----------------------------|---------------|---------------------------|---|
| AMMI OR 'Ajwain' | <u>Trachyspermum ammi</u> | Apiaceae | Fruits | Flavouring curries |
| 'Kala Jeera' | <u>Bunium persicum</u> | Apiaceae | " | " |
| GREATER CARDAMOM 'Bari elachi' | <u>Ammonium subulatum</u> | Zingiberaceae | Seeds | " |
| INDIAN MUSTARD OR 'Rai' | <u>Brassica juncea</u> | Brassicaceae | " | Flavouring food |
| WHITE MUSTARD OR 'Safed Rai' | <u>B. hirta</u> | " | " | " |
| BLACK MUSTARD OR 'Kali Rai' | <u>B. nigra</u> | " | " | " |
| CARDAMOM OR 'Chhoti elachi' | <u>Elettaria cardamomum</u> | Zingiberaceae | " | In curries, pickles and with betel leaf |
| NUTMEG OR 'Jajphal' | <u>Myristica fragrans</u> | Myristicaceae | DRIED SEED WITHOUT TESTA | In Flavouring curries pudding & custards |
| MACE OR 'Javitri' | " | " | ARIL ATTACHED TO SEED TIP | " |

| C.N. | B.N. | F. | PART(S) USED | USES |
|------------------------------|---|------------|----------------------------------|-----------------|
| SARSAPARILLA | <i>Smilax aristolochiaefolia</i> <i>S. officinalis</i> | Kilicaceae | Roots | Flavouring food |
| CINNAMON or 'Dal chini' | <i>Cinnamomum Zeylanicum</i> | Lauraceae | Bark | " |
| 'CASSIA' | <i>C. cassia</i> | " | " | " |
| INDIAN CASSIE or 'Tejpat' | <i>C. tanala</i> | " | leaves and bark. | " |
| CORIANDER or 'Dhaniya' | <i>Coriandrum sativum</i> | Apiaceae | Leaves and fruits | " |
| MAJORAM or 'Manua' | <i>Majorana hortensis</i> | Lamiaceae | Leaves, flowers and young shoots | " |
| MINT or 'Pudina' | <i>Mentha sp.</i> | " | Leaves | " |

| C.N. | B.N. | F. | PART(S) USED | USES |
|--------------------------------|---|-----------|--|---|
| 'Curry patta' OR 'Meetha Neem' | <u>Murraya koenigii</u> | Rutaceae | Leaves are used especially in South India. | Flavouring for |
| THYME | <u>Thymus vulgaris</u> | Lamiaceae | Leaves. | " |
| DILL OR 'Soya' | <u>Anethum graveolens</u> <u>A. sowa</u> | Apiaceae | Leaves. | |
| SAFFRON OR 'Kesar' | <u>Crocus sativus</u> | Iridaceae | Dried styles and stigmas. | Provide yellow colour and a characteristic pleasant odour |
| CLOVE OR 'Lawng' | <u>Syzygium aromaticum</u> | Myrtaceae | Flower buds. | Flavour and aroma to food. |
| ROSE OR 'Gulab' | <u>Rosa sp.</u> | Rosaceae | Flowers | " |

| C.N. | B.N. | F. | PART(S) USED | USES |
|---------------------------|----------------------------------|----------------|--------------|-------------------------------------|
| FENUGREEK or 'Maithee' | <u>Trigonella foenum-graecum</u> | Papilionaceae | Seeds | In flavouring curries & pickles |
| Garlic or 'Lohsun' | <u>Allium sativum</u> | Liliaceae | Bulb. | In curries and in and as pickles |
| VANILLA | <u>Vanilla planitfolia</u> | Orchidaceae | Fruits | Flavouring food |
| TAMARIND | <u>Tamarindus indica</u> | Caesalpinaceae | Fruits | Flavouring curries and pickle. |
| PARSLEY | <u>Petroselinum crispum</u> | Umbelliferae | Leaves | Flavouring food |
| ANISE | <u>Pimpinella anisum</u> | Apiaceae | Fruits | " |
| 'HORSE RADISH' | <u>Armoracia lapathifolia</u> | Ranunculaceae | Roots | " |

FODDER PLANTS.

FODDER

Evolution

| | | | | |
|--------------------------------------|-------------------------------|-------------|------------------------|--|
| ELEPHANT GRASS OR NADIER GRASS | <u>Pennisetum purpureum</u> | POACEAE | Whole vegetative shoot | |
| Sudan Grass | <u>Sorghum sudanense</u> | " | " | |
| GUINEA GRASS | <u>Panicum maximum</u> | " | " | |
| DRCA GRASS | <u>Brachiaria mutica</u> | " | " | |
| 'Berseem' | <u>Trifolium alexandrinum</u> | Leguminosae | " | |
| INDIAN CLOVER 'Seri' | <u>Melilotus indica</u> | " | " | |
| Lucerne | <u>Medicago sativa</u> | " | " | |
| 'Doob' | <u>Cynodon dactylon</u> | POACEAE | " | |
| 'Jowar' | <u>Sorghum vulgare</u> | " | " | |
| BATS | <u>Avena sativa</u> | " | " | |
| Tesinte | <u>Euchlaena mexicana</u> | " | " | |

| | | | |
|-------------|---------------------------|----------|------------------|
| MAIZE | <u>Zea mays</u> | Poaceae | Stem and leaves. |
| PADDY STRAW | <u>Oryza sativa</u> | " | " |
| WHEAT STRAW | <u>Triticum aestivum</u> | " | " |
| BANYAN TREE | <u>Ficus benghalensis</u> | Moraceae | Leaves to goats |
| FICUS | <u>F. infectoria</u> | " | " |

They are classified as follows :

② ALCOHOLIC BEVERAGES: These include either fermentation product

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| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED |
|---------------|---|---------------|---|
| TEA OR 'Chai' | <u>Thea sinensis</u> OR <u>Camellia sinensis</u> | Theaceae | Young leaves are picked by hand and then fermented to black colour. They are then dried and graded carefully. Tannin and alkaloid (theine) are present in leaves. |
| COFFEE | <u>Coffea</u> sp. <u>C. arabica</u> = Arabian Coffee <u>C. liberica</u> = Liberian coffee <u>C. robusta</u> = Congo coffee | Rubiaceae | Roasted seed powder of the plant, which contain 'Caffeine'. |
| COCOA | <u>Theobroma cacao</u> | Sterculiaceae | Seeds. |
| COLA | <u>Cola acuminata</u> <u>Cola nitida</u> | " | " |
| MATE | <u>Ilex paraguariensis</u> | Ellagaceae | Leaves |

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| C.N. | B.N. | F. | PART(S) USED |
|--------|--|-----------------------|--|
| WHISKY | Cereals or <u>Solanum tuberosum</u> | Poaceae Solanaceae | Distillation product of malted or unmalted cereal or potato starch. It contains about 50% alcohol. |
| BRANDY | <u>Vitis vinifera</u> | Vitaceae | Distillation product of wine. It contains 65 - 70% alcohol. |
| FENNY | <u>Anacardium occidentale</u> | Anacardiaceae | Distillation product- from cashew nut. |

DRUG YIELDING PLANTS

evolution

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | USES |
|-------------------------------|------------------------------|---------------|---|---|
| ACONITE OR Meetha Zahar | <u>Aconitum napellus</u> | Ranunculaceae | The tuberos roots contain alkaloids like 'aconite'. | Rheumatism and neuralgia |
| SWEET FLAG, OR 'Bach' | <u>Aconis calamus</u> | Araceae | Rhizomes are used. | Emetic, expectorant and treat chronic diarrhoea and dyspepsia |
| IPEACAC | <u>Cephaelis ipecacuanha</u> | Rubiaceae | Roots are used. | In amoebic dysentery and as expectorant. |
| COLCHICUM OR 'HIRANTUTIYA' | <u>Colchicum luteum</u> | Liliaceae | Roots and corms of the plant are used which contain an alkaloid 'colchicine'. | In gout, rheumatism and diseases of liver |
| TURMERIC OR 'Haldi' | <u>Curcuma longa</u> | Zingiberaceae | Rhizomes are used. | Used to cure ulcers, diarrhoea and skin diseases |

| C.N. | B.N. | F | PART(S) USED | USES |
|---------------------------|---------------------------|---------------|---|--|
| YAM | <u>Dioscorea</u> sp | Dioscoreaceae | Rhizome contains a steroid ' <u>diosgenin</u> ' | As eye ointment and ingredients in preparation of contraceptive pills. |
| ASA-FOETIDA OR Heng | <u>Ferula asafetida</u> | Apiaceae | Gum resin is obtained from the roots. | In cough, indigestion and asthma. |
| LICORICE OR 'Mulethi' | <u>Glycyrrhiza glabra</u> | Papilionaceae | Dried roots of the plant. | As demulcent and expectorant. |
| Chandra Moel | <u>Kaempferia galanga</u> | Zingiberaceae | Rhizomes are used. | Stimulant and carminative. |
| GINSENG | <u>Panax schinseng</u> | Araliaceae | Roots of the plant. | A variety of diseases are cured especially in China. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|-------------------|-----------------------------|---------------|--|--|
| 'SARPGANDHA' | <u>Rauwolfia serpentina</u> | Apocynaceae | Tuberous roots contain the alkaloid 'reserpine'. | In lowering of blood pressure; mental disorder; diarrhoea and dysentery. |
| RHUBARB | <u>Rheum officinale</u> | Polygonaceae | Rhizomes and roots yield 'Rhubarb'. | In intestinal disorders, especially as laxative and tonic. |
| 'ASGANDH' | <u>Withania somnifera</u> | Solanaceae | Roots contain an alkaloid 'withaferin A' having antibiotic properties. | In rheumatism; cough, ulcers. |
| GINGER or 'ADRAK' | <u>Zingiber officinale</u> | Zingiberaceae | Rhizomes. | In rheumatism; piles, neuralgia; toothache and diseases of eye. |

| C.N. | B.N. | F | PART(S) USED | USES |
|---------------------------|---|----------------|---|-----------------------------|
| EPHEDRA | <u>Ephedra sinica</u> <u>E. equisetina</u> | Gnetaceae | Green stems contain the alkaloid 'ephedrine'. | In cold & asthma. |
| SANDAL OR 'CHANDAN' | <u>Santalum album</u> | Santalaceae | Stem | In skin diseases. |
| GALBANUM 'Bairaga' OR | <u>Resula galbaniflua</u> | Apiaceae | Stem | In bronchitis and asthma. |
| GUAIACUM | <u>Guaiacum officinale</u> | Zygophyllaceae | Hard resin from wood | As stimulant and laxative. |
| RUSSIA | <u>Piceasua excelsa</u> | Simarubaceae | Stem | In dyspepsia and malaria. |
| INDIAN KINO OR 'Pitarasa' | <u>Pterocarpus marsupium</u> | Papilionaceae | Stem | In diarrhoea and toothache. |

| C.N. | B.N. | F | PART USED | USES |
|-----------------------------|------------------------------|-----------------|-----------|--|
| QUININE | <u>Cinchona officinalis</u> | Rubiaceae | Bark | In treatment of malaria. |
| 'CINNAMON' OR 'Dolchini' | <u>Cinnamomum zeylanicum</u> | Lauraceae | " | In diarrhoea and gastric troubles and controlling blood sugar. |
| INDIAN REDWOOD OR ROHAN | <u>Soyimida febrifuga</u> | Meliaceae | " | In diarrhoea, dysentery and malaria. |
| INDIAN MEDLAR OR 'Maulsiri' | <u>Mimusops elagné</u> | Sapotaceae | " | Diseases of gums and teeth. |
| 'ASHOK' | <u>Saraca indica</u> | Caesalpiniaceae | " | In leucorrhoea. |
| 'KUCHLA' | <u>Strychnos toxifera</u> | Loganiaceae | " | In relaxing muscles. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|------------------------------|-------------------------|---------------|---|--|
| 'ANASPHAL' | <u>Glicium verrum</u> | Magnoliaceae | Fruits | As carminative and expectorant. |
| 'SAFED ARAND' | <u>Tatopha cucas</u> | Euphorbiaceae | Seed oil | As purgative. |
| 'SATHAN' | <u>Moringa oleifera</u> | Moringaceae | Seed oil. | In rheumatism and gout. |
| 'KARANJA' | <u>Pongamia pinata</u> | | Seed oil. | In skin diseases. |
| CASTOR or 'ARAND' | <u>Ricinus communis</u> | Euphorbiaceae | Seed oil contains an alkaloid 'ricinine'. | As laxative and purgative. |
| BLACK NIGHT SHADE or 'Makai' | <u>Solanum nigrum</u> | Solanaceae | Fruits | As laxative, expectorant and also used as cardiac tonic. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|-----------------------------------|------------------------------|----------------|-------------------------------|--|
| BALLERIC MYROBALAN OR 'Bahera' | <u>Terminalia ballerica</u> | Combretaceae | Ripe fruits. | As tonic & laxative and in piles & diarrhoea. |
| | | | Semi-ripe fruits. | As purgative. |
| CHEBULIC MYROBALAN OR 'Harash' | <u>Terminalia chebula</u> | " | Ripe fruits. | As tonic and laxative and in diarrhoea, dysentery, flatulence and asthma. |
| AMMI OR 'Ajwain' | <u>Trachyspermum ammi</u> | Apiaceae | Fruits. | As carminative and stimulant and in diarrhoea and dysentery |
| 'AMALTAS' | <u>Cassia fistula</u> | Caesalpinaceae | " | As purgative and in diabetes. |
| COLOSYNTH OR 'Indrayan' | <u>Citrullus colocynthus</u> | Cucurbitaceae | Fruits contain glycosides. | Powerful purgative |

| C.N. | B.N. | F. | PART(S) USED | USES |
|-------------------|---------------------------|----------------|--|---|
| EMBLIC MYROBHAM | <u>Emblia officinalis</u> | Euphorbiaceae | Fruits. | As laxative, diuretic and tonic. Also, the relieve constipation & vomiting |
| FENNEL or 'Saunf' | <u>Foeniculum vulgare</u> | Apiaceae | " | As carminative, stimulant and appetiser. They also relieve flatulence, thirst and problems of kidney & spleen |
| 'CHALMOGRA' | <u>Hydnocarpus kurzii</u> | Flacaurtiaceae | Seed oil. | In skin diseases including leprosy. |
| OPUM POPPY 'Apen' | <u>Papaver somniferum</u> | Papaveraceae | Latex from unripe fruits contains many alkaloid. | Alkaloid morphine relieves pain and codeine is analgesic. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|------------------------------|----------------------------|-------------|--|---|
| 'KABABCHINI' or CUBEBS | <u>Piper cubeba</u> | Piperaceae | Fruits. | In catarrh and as kidney stimulant. |
| 'PIPLAMOOL' or LONG PEPPER | <u>Piper longum</u> | " | " | Carminative; In treatment of bronchitis and asthma. |
| BLACK PEPPER 'Kali Mirch' | <u>Piper nigrum</u> | " | " | As carminative and stimulant. Also used in cholera, diarrhoea and flatulence. |
| NUX VOMICA or 'Kuchla' | <u>Strychnos nuxvomica</u> | Loganiaceae | Seeds contain alkaloids like Strychnine and brucine. | In nervous disorders and paralysis. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|---------------------|------------------------|---------------|---|--|
| HOPS | <u>Humulus lupulus</u> | Maraceae | Flowers contain a narcotic principle 'lupulin'. | As sedative and as tonic. |
| WOOD APPLE or 'Bel' | <u>Aegle marmelos</u> | Rutaceae | Fruit pulp is cooling. | As laxatives, astringent, diarrhoea and dysentery. |
| JAMALGHOTA' | <u>Croton tiglium</u> | Euphorbiaceae | Seed oil. | Powerful purgative. |
| CUMIN or 'Zera' | <u>Cuminum cyminum</u> | Apiaceae | Fruits. | As carminative, stimulant and astringent. Also used in diarrhoea and nausea. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|-------------------------|------------------------|---------------|---|---|
| SANTONIN | <u>Artemisia Cina</u> | Asteraceae | Flower buds. | As purgative as well as anthelmintic. |
| IRON WOOD OR 'Nagkesar' | <u>Mesua ferrea</u> | Clusiaceae | " | In dysentery and bleeding piles. |
| 'VIOLET' OR 'Bonafsha' | <u>Viola odorata</u> | Violaceae | Flower buds and flowers. | As diuretic, laxative and astringent. |
| 'CHARAS' | <u>Cannabis sativa</u> | Cannabinaceae | Flowers contain a hallucinogenic principle called 'Tetrahydrocannabinol'. | As narcotic and intoxicant. |
| 'SAFFRON' OR 'Kesar' | <u>Crocus sativus</u> | Iridaceae | Styles and stigma are used. | As stimulant nerve sedative and diuretic. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|----------------------------|--------------------------|-------------|---|--|
| MALABAR NUT 'Vasaka' or | <u>Adhatoda vesica</u> | Acanthaceae | Leaves contain alkaloid 'vaccine'. | In the treatment of bronchitis & asthma; also in diarrhoea and malaria. |
| ALOE or 'Gheet Kumari' | <u>Aloe barbadensis</u> | Liliaceae | Succulent leaves. | In gonorrhoea, skin diseases & diseases of liver and spleen. |
| BELLADONNA | <u>Atropa belladonna</u> | Solanaceae | Leaves and roots contain alkaloids like 'atropine' & 'hyoscyamine'. | In plasters and tinctures to relieve pain. It dilates pupil, cures asthma and is antidote for poisoning. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|------------------------------------|---------------------------|------------------|---|--|
| INDIAN PENNYWORT OR 'Brahmi' | <u>Centella asiatica</u> | Apiaceae | Leaves. | As diuretic and in chronic - eczema, rheuma- -tism, madness & cholera. |
| 'DHATURA' | <u>Datura stramonium</u> | Solanaceae | Leaves contain alkaloids like 'atropine', 'hyoscy- amine', 'scopolamine' etc. | In relaxing bronchial muscles and treating asthma |
| 'TILPUSHPI' | <u>Digitalis purpurea</u> | Scrophulariaceae | Leaves contain a glucoside, 'digit- oxin'. | In stimulating cardiac muscle |
| 'COCAINE' | <u>Erythroxylum coca</u> | Erythroxylaceae | Leaves contain an alkaloid 'cocaine'. | Used as a local anaesthetic and a tonic for digestive and nervous system |

| C.N. | B. N. | F. | PART(S) USED | USES |
|-------------------------------------|---------------------------|------------|---|---|
| 'HENBANE' or 'Khusasani Ayudain' | <u>Hyooscyamus niger</u> | Solanaceae | Leaves contain poisonous alkaloid is like hyoscyamine and scopolamine. | Used as sedative and hypotensive. |
| 'MARUA' | <u>Majorana hortensis</u> | Lamiaceae | Leaves. | Used as stimulant and carminative. |
| MINT | <u>Mentha sp.</u> | Lamiaceae | Leaves yield <u>menthol</u> . | Used in the treatment of cold. |
| BASIL OR 'Tulsi' | <u>Ocimum sp.</u> | Lamiaceae | Leaves | Used in cough, fever, seminal weakness. |
| THYME | <u>Thymus vulgaris</u> | Lamiaceae | Leaves contain an essential oil desig- nated 'thymol'. It is effective against hookworm | In toothpaste, mouthwash. It is effective against hookworm |

| C.N. | B.N. | F. | PART(S) USED | USES |
|--------------------|-----------------------------|----------------|----------------------------------|--|
| 'WORM WOOD' | <u>Artemisia absinthium</u> | Asteraceae | oil is obtained from the leaves. | Acts as a purgative. |
| MARGOSA' or 'Neem' | <u>Azadirachta indica</u> | Meliaceae | Leaves contain 'Azadirachtin' | Acts as an insecticide. |
| | <u>Cassia angustifolia</u> | Caesalpinaceae | Leaves. | As laxative and purgative. |
| 'PAAN' | <u>Piper betle</u> | Piperaceae | Leaves | As carminative, astringent, stimulant and expectorant. |

| C.N. | B.N. | F | PART(S) USED | USES |
|-----------------|-----------------------------|---------------|--------------------|---|
| 'RASAUT' | <u>Berberis aristata</u> | Berberidaceae | Bark of the roots. | In treatment of eye troubles. |
| 'SAFED MOOSLI' | <u>Asparagus adscendens</u> | Liliaceae | Roots are used. | In diarrhoea and dysentery. |
| 'SARSA PARILLA' | <u>Smilax reynanica</u> | Liliaceae | Roots. | Skin, venereal diseases and rheumatism. |

GUMS AND RESINS:

Gums are colloidal in nature, soluble in water, sweet in taste, form as a result of gummoses of internal tissues involving the decomposition of cellulose. They are close allies of pectin and are naturally exuded when plants are wounded.

Resins are the oxidation products of essential oils. They are secreted in specific canals or cavities. They show hardening on contact with air and possess antiseptic qualities and, thus, prevent decay. They are soluble in water but insoluble in organic solvents. They, being soluble in alkalies, form soaps.

They are categorised as follows:

(I) HARD RESINS: They have little amount of essential oils, hence, are solid at room temperature.

eg: Damare, copals, ambers, shellac, sandrac, lacquer etc.

(II) OLEORESINS: Liquid at room temperature.

eg: turpentine, balsams etc.

(III) GUM RESINS: Mixture of true gums and resins, exuded as a milky substance.

eg: Asafoetida, Myrrh and Opopanax etc.

Tannins are complex organic compounds generally glucosidal in nature and medicinally strong astringents.

Latex is a milky white or coloured gummy emulsion (containing acids, salts sugars, oils, resins, proteins and hydrocarbons) in water. It contains a special substance caoutchouc which is used as a source of rubber. It is secreted in special cells or vessels.

e.g. products of latex include rubber, gutta-percha, chicle, balata etc.

GUMS

| COMMON NAME | BOTANICAL NAME | FAMILY |
|-----------------|------------------------------|--------------|
| GUM ARABICA | <u>Acacia arabica</u> | Mimosaceae |
| KORDOFAN GUM | <u>A. senegal</u> | " |
| 'BABUL-KI-GOND' | <u>A. nilotica</u> | " |
| MOCHARAS | <u>Bombax malabaricum</u> | Bombacaceae |
| PALAS-KI-GOND | <u>Butea monosperma</u> | Fabaceae |
| FERONIA-GUM | <u>Feronia limonia</u> | Rutaceae |
| GUM KINO | <u>Pterocarpus marsupium</u> | Fabaceae |
| Hattia-Ki-Gond | <u>Ceiba pentandra</u> | Bombacaceae |
| GUM GHATTI | <u>Anogeissus latifolia</u> | Combretaceae |
| - COWA | <u>Garcinia cowa</u> | Clusiaceae |
| MESQUITE GUM | <u>Prosopis sp.</u> | Mimosaceae |
| Benzoin | <u>Styax benzoin</u> | Styracaceae |

| C.N. | B.N. | F. | Comments |
|--------------------|-------------------------------------|-------------------------|--|
| GUM TRAGACANTH | <u>Astragalus gummifera</u> | <u>Papilionaceae</u> | |
| 'Katira gum' | <u>Sterculia urens</u> | <u>Sterculiaceae</u> | |
| <u>SINS</u> | | | |
| <u>HARD RESINS</u> | | | |
| 'Damar's' | <u>Vateria indica</u> | <u>Dipterocarpaceae</u> | white damar |
| | <u>Balanocarpus heinii</u> | " | Penak damar |
| | <u>Shorea hypochra</u> | " | Penak damar |
| | <u>Canarium strictum</u> | <u>Burseraceae.</u> | Black damar |
| 'Cepal's' | <u>Agathis australis</u> | <u>Araucariaceae</u> | Kauri cepal |
| | <u>A. alba</u> | " | Manila cepal |
| 'Amber' | <u>Pinites succinifera</u> | <u>Pinaceae</u> | |
| 'Shellac' | <u>Tachanadia leeca</u> (INSECT) | | on plants like <u>Acacia nilotica</u> , <u>Butea monosperma</u> <u>Ficus religiosa</u> etc. |

| C.N. | B.N. | F. | |
|-------------------|------------------------------|---------------|--|
| Sandrac | <u>Callitris quadrivalis</u> | Cupressaceae | |
| Lacquer | <u>Rhus succulanea</u> | Anacardiaceae | |
| <u>LEO-RESINS</u> | | | |
| Turpentine | <u>Pinus australis</u> | Pinaceae | |
| Canada Balsam | <u>Abies balsamea</u> | " | |
| Spruce gum | <u>Picea rubens</u> | " | |
| Resin | <u>Pinus roxburghii</u> | " | |
| Tar | <u>P. longifolia</u> | " | |
| <u>UMRESINS</u> | | | |
| Cambooge | <u>Garcinia morella</u> | Clusiaceae | |
| Salai Guggul | <u>Boswellia serrata</u> | Burseraceae | |
| Myrrh | <u>Commiphora myrrha</u> | " | |

| C.N. | B.N. | F. | | |
|------------|----------------------|----------------|--|--|
| Asafoetida | Fesula asafoetida | Apiaceae | | |
| Opepanax | Opepanax clematium | " | | |
| TANNINS | | | | |
| 'Canaique' | Rumex hymenosepalus | Polygonaceae | | |
| Chestnut | Castanea dentata | Fagaceae | | |
| Quebracho | Schinopsis lorentzii | Anacardiaceae | | |
| Sumac | Rhus sp. | " | | |
| Gambier | Uncaria gambier | Rubiaceae | | |
| Divi-divi | Caesalpinia coriaria | Caesalpinaceae | | |
| 'Bahera' | Terminalia bellaria | Combretaceae | | |
| 'Harara' | T. chebula | " | | |

LATEX PRODUCTS:

| COMMON NAME | BOTANICAL NAME | FAMILY | COMMENTS |
|------------------|-----------------------------|---------------|--|
| HEVEA RUBBER | <u>Hevea brasiliensis</u> | Euphorbiaceae | |
| CASTILLA RUBBER | <u>Castilla elastica</u> | Moraceae | |
| INDIAN RUBBER | <u>Ficus elastica</u> | " | |
| Dandelion Rubber | <u>Taraxacum kok-saghyz</u> | Asteraceae | |
| Ceara Rubber | <u>Manihot glaziovii</u> | Euphorbiaceae | |
| Gutta-percha | <u>Paladium gutta</u> | Sapotaceae | Non-elastic rubber Used in insulating & telephone receive |
| Chicle | <u>Achras sapota</u> | " | Used in 'Chewing-gums' |
| Balata | <u>Malinkara bidentata</u> | " | Non-elastic rubber used as substitute of gutta percha. |

INSECTICIDES, DYES, NARCOTICS, FUMIGATORIES & MASTICATORIES AND WAXES.

evolution

INSECTICIDES OF PLANT ORIGIN

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED |
|-----------------|---|----------------|-----------------------|
| PYRETHRUM | Chrysanthemum sp. C. cinerariifolium C. coccineum | Asteraceae | Unopened flower buds. |
| ROTENONE | Lonchocarpus sp. Derris elliptica | Leguminosae | Root Root Root |
| Cockroach Plant | Haplophyton cinnicidum | Apocynaceae | Dried leaves |
| Custard Apple | Annona squamosa | Anonaceae | Seeds. |
| Anabasis | Anabasis aphylla | Chenopodiaceae | leaves and stem. |
| Indigo bush | Amorpha fruticosa | Leguminosae | Fruits. |
| Margosa | Azadirachta indica | Meliaceae | leaves & fruits. |
| Nicotine | Nicotiana tabacum | Solanaceae | leaves. |

DYES

Evolution

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | USES |
|---------------------------|------------------------------------|---------------|--------------|------------------------|
| MADDER | <u>Rubia</u> sp. | Rubiaceae | Roots | A red dye is obtained. |
| Barberry | <u>Barbavis</u> <u>aristata</u> | Berberidaceae | Roots | A yellow dye. |
| TURMERIC | <u>Curcuma</u> <u>longa</u> | Zingiberaceae | Rhizomes | A yellow dye. |
| Lakad | <u>Rhannus</u> <u>globosa</u> | Rhamnaceae | Bark | A green dye. |
| QUERCITRON | <u>Quercus</u> <u>velutina</u> | Fagaceae | Bark | Bright yellow dye |
| TEAK | <u>Tecton</u> <u>grandis</u> | Verbenaceae | Bark | Yellow dye |
| INDIGO or 'Neldi' | <u>Indigofera</u> <u>tinctoria</u> | Papilionaceae | Leaves | A blue dye. |
| HENNA or 'Mehandi' | <u>Lawsonia</u> <u>inermis</u> | Lythraceae | Leaves | Orange dye |
| FLAME OF FOREST or 'Tesu' | <u>Butea</u> <u>monosperma</u> | Papilionaceae | Flowers | Orange-yellow dye |
| SAFFLOWER | <u>Carthamus</u> <u>tinctorius</u> | Asteraceae | Flowers | Yellow dye. |

| C.N. | B.N. | F. | PART(S) USED | USES |
|-----------------------|---|----------------|--|-----------------|
| SAFFRON OR 'Kesar' | <u>Crocus sativus</u> | Iridaceae | Style and stigma | Yellow dye. |
| 'Harsingar' | <u>Nyctanthes arborescens</u> | Oleaceae | Flowers | Orange dye. |
| RED CEDAR 'Tun' | <u>Toona ciliata</u> | Meliaceae | Flowers | Yellow-red dye. |
| 'Meetha Indragol' | <u>Wrightia tinctoria</u> | Apocynaceae | Flower | Blue dye. |
| SAP GREEN | <u>Rhamnus cathartica</u> | Rhamnaceae | Fruit | Green dye. |
| ANNATTO | <u>Bixa orellana</u> | Bixaceae | Aril | Yellow |
| 'GAMBOSE' | <u>Garcinia morella</u> <u>G. cowa</u> | Chusciaceae | Gum resin obtained from different parts. | Yellow dye. |
| LOG-WOOD | <u>Haematoxylon campechianum</u> | Caesalpinaceae | Heartwood | Purple red dye |
| RED SANDLEWOOD | <u>Pterocarpus santalinus</u> | Papilionaceae. | wood | |
| WOOD' | <u>Isatis tinctoria</u> | Brassicaceae | Leaves | Indigo colour. |

NARCOTICS

evolution

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | |
|---------------------------------|---|-----------------|------------------------------|--|
| THORN APPLE or 'Jimson weed' | <u>Datura stramonium</u> | Solanaceae | Seeds | |
| COLA | <u>Cola nitida</u> | Stenuliaceae | Seeds or nuts | |
| COCAINE | <u>Erythroxylum coca</u> | Erythroxylaceae | Leaves. | |
| Tobacco | <u>Nicotiana glauca</u> and other species. | Solanaceae | " | |
| BETEL NUT PALM | <u>Areca catechu</u> | Areaceae | Fruit | |
| INDIAN HEMP | <u>Cannabis sativa</u> | Cannabaceae | Leaves and female flowers | |

FUMITORIES & MASTICATORIES

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED | USES |
|-----------------------|---------------------------|---------------|--|---|
| ARECA NUT OR 'Supari' | <u>Areca catechu</u> | Areaceae | Drupe with fibrous mesocarp are produced. | Ruminant Endosp is masticatory |
| 'Bhang' OR MARIJUANA | <u>Cannabis sativa</u> | Cannabinaceae | Leaves and young twigs are dried. | The preparation is mixed with cold drinks. |
| 'Ganja' | " | " | Dried female flowers. | It is smoked. |
| 'Charas' OR 'Hashish' | " | " | Yellowish resin from female flowers. | Smoked. |
| Tobacco OR 'Tambaku' | <u>Nicotiana tabacum</u> | Solanaceae | Leaves contain an alkaloid 'nicotine' which is narcotic. | Chewed and smoked. |
| Opium Poppy OR 'Acon' | <u>Papaver somniferum</u> | Papaveraceae | Latex exudate from unripe fruits contains alkaloids like 'morphine' and 'codeine'. | A habit forming drug which depresses the nervous system |
| BETEL OR 'Paan' | <u>Piper betle</u> | Piperaceae | Fresh or bleached leaves. | Chewed with cal. and hydrated lime |

| C.N. | B.N. | F. | PART(S) USED | USES |
|--------------------------------|--------------------------|-----------------|--|---------------------------------|
| COLA | <u>Cola nitida</u> | Sterculiaceae | Nuts. contain 'caffeine' and 'scopolamine'. | They lessen hunger and fatigue. |
| THORN APPLE 'Datura' | <u>Datura stramonium</u> | Solanaceae | seeds contain an alkaloid scopolamine. | It is a hallucinogen. |
| Coca | <u>Erythroxylon coca</u> | Erythroxylaceae | Leaves contain an alkaloid 'cocaine'. | Reduces fatigue. |
| HENBANE 'Khurasani Aiyuain' | <u>Hyoscyamus niger</u> | Solanaceae | Leaves and flower tubs yield the drug 'henbane'. | Its leaves are smoked. |

WAXES.

| COMMON NAME | BOTANICAL NAME | FAMILY | PART(S) USED. |
|-----------------|---------------------------------|---------------|---------------|
| CAUASSU WAX | <u>Calathea lutea</u> | Marantaceae | leaves. |
| CERA WAX | <u>Cerroylon andicola</u> | Aracaceae | Stem. |
| CARNAUBA WAX | <u>Copernicia cerifera</u> | " | leaves |
| Tajoba wax | <u>Simmondsia chinensis</u> | Buxaceae | Seeds |
| Myrtle wax | <u>Mysica cerifera</u> | Mysicaceae | Fruits |
| Candellilla wax | <u>Euphorbia antispithitica</u> | Euphorbiaceae | Stems |

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